Section ii is devoted to the consideration of zonal functions, *i.e.*, functions suitable when the conditions are symmetrical about an axis. Section iii deals with the general case, whilst in the last section illustrations of the use of the functions are given by application to several problems, such as the potentials of tores under the action of an electrified ring, or point of electricity, and the velocity potential when a tore moves parallel to itself in a fluid. Among the results obtained, which may be mentioned here, is the electrical capacity of an anchor ring. When the section of the ring is not very large compared with the central opening, a very close approximation is given by the formula—

$$q = \sqrt{R^2 - r^2} \left\{ \frac{F'}{F} + \frac{F'}{E} - \frac{E'}{E} \right\}$$

where

$$k^2 = 2\frac{\sqrt{R^2 - r^2}}{R + \sqrt{R^2 - r^2}},$$

R, r being the radii of the circular axis, and generating circle of the ring respectively.

The approximation is so close that the formula only makes an error of about ·3 per cent. when r is so large as $\frac{1}{3}$ R.

If a tangent be drawn from the centre to the anchor ring, and a sphere be described with this for radius, the capacity of the tore measured in terms of that of the sphere is

$$\frac{F'}{F} + \frac{F'}{E} - \frac{E'}{E},$$

when R=10r this is ·36049,

when R=5r this is ·43405.

VI. "Microscopical Researches in High Power Definition. Preliminary Note on the Beaded Villi of Lepidoptera-Scales as seen with a Power of 3,000 Diameters." By Dr. ROYSTON-PIGOTT, F.R.S. Received January 15, 1881.

In carrying out the investigation of the molecular structure of insect scales, under the finest attainable amplification, the discovery has been made that the striated surfaces of these scales, though appearing approximately beaded, are really covered with villi, chenille or velvet pile, terminating in a spherule.

The recognised object of these striæ regarded as corrugations is to give strength to a most delicate tissue, which are again supported by *cross striæ*. Upon these transverse striæ I have discovered villi erected

upon them by twos and threes, and summits consisting of a refracting spherule.   This very difficult observation appears to open a new field of research.   The object upon which these beaded villi were first detected is the scale of the *Vanessa Atalanta*, or Red Admiral.

<center>*March* 10, 1881.</center>

<center>THE PRESIDENT in the Chair.</center>

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read :—

I. " On the Conversion of Radiant Energy into Sonorous Vibra-- tions."   By WILLIAM HENRY PREECE.   Communicated by the PRESIDENT.   Received February 21, 1881.

Messrs. Graham Bell and Sumner Tainter* have shown that, under certain conditions, intense rays of light, if allowed to fall with periodic intermittence upon thin disks of almost every hard substance, will set up disturbances in those disks corresponding to this periodicity which result in sonorous vibrations.   Mr. Bell has subsequently shown that such effects are not confined to hard substances, but that they can be produced by matter in a liquid form.

These discoveries have elicited a considerable amount of interest, and have led to the inquiry whether the sonorous effects are due, as the discoverers themselves surmised, to *light*, or as the President of the Royal Society, Professor Tyndall, and others have suggested to radiant *heat*.

Messrs. Bell and Tainter have partially answered this question by showing that the disturbances are not necessarily due to light, for they found that sheets of hard rubber or *ebonite*—a substance opaque to light—do not entirely cut off the sounds, but allow certain rays to pass through, which continue the effect.   M. Mercadier, who has studied the subject with great care,† has shown that the effects are confined to the red and ultra-red rays.   Moreover, Professor Tyndall has shown‡ that gases, such as sulphuric ether, which he had proved to be highly absorbent of heat rays, while they are transparent to

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* American Association for the Advancement of Science.   Boston, August 27, 1880.

† " Comptes Rendus," tome 91, p. 929.

‡ " Journal of the Society of Telegraph Engineers," vol. 9, p. 404.